

# Mercury in the Environment



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## **What is mercury?**

Mercury is found naturally in the environment in several forms. In its elemental form, it is a shiny, silver-white, liquid metal used in thermometers, electrical switches, fluorescent lightbulbs, thermostats and many other products. It can be combined with other elements to form inorganic compounds. Mercury can evaporate to form colorless, odorless mercury vapors. Mercury can combine with organic material to form organic compounds such as methylmercury, which is produced primarily by bacteria and is the form which poses the greatest concern for environmental exposure.

## **What happens to mercury when it enters the environment?**

Mercury is persistent, mobile and bioaccumulative in the environment, meaning it is retained in organisms. Most of the mercury found in the environment is inorganic. Today, inorganic mercury primarily enters the environment through emissions to the air from several sources. Examples of sources include emissions of coal-fired power plants, burning municipal and medical waste, and natural processes such as erosion of ores and volcanic activity. In aquatic systems, inorganic mercury can be converted to methylmercury. Methylmercury is quickly taken up into higher organisms through the food chain and is retained in their bodies. It reaches the highest levels in large predatory fish and in birds and mammals which consume fish. Levels of methylmercury in fish are typically 100,000 times those in the water in which they swim.

## **How can people be exposed to mercury?**

People are most likely to be exposed to metallic mercury when it is released from dental fillings; however, the amount of mercury released from dental fillings is generally not considered to be high enough to cause adverse health effects. Exposure may also result from breathing in air contaminated with vapors from metallic mercury spills or from home use of metallic mercury in ritual and religious practices. In some areas of New Jersey, groundwater has been found to contain elevated levels of mercury and private wells using this groundwater can provide household water containing inorganic mercury. Mercury in the form of methylmercury is of greatest concern, and the common route of exposure is ingestion. Methylmercury is of particular concern because it can build up in certain fish to high levels and these fish may then be eaten by people. Federal Food and Drug Administration (FDA) regulations prohibit the sale of commercial fish that are found to have high levels of methylmercury. Also, the State of New Jersey has issued public health advisories to warn people about eating certain fish caught from local waters that are contaminated with mercury.

## **How can mercury affect my health?**

Whether any symptoms of mercury exposure actually occur, and the nature and severity of the symptoms, depend on the amount of exposure. Exposure to high levels of elemental mercury vapor can result in nervous system damage, including tremors, and mood and personality alterations. Exposure to relatively high levels of inorganic mercury salts can cause kidney damage. Adult exposure to relatively high levels of methylmercury through fish consumption can result in numbness or tingling in the extremities, sensory losses and loss of coordination. Exposure of the developing fetus through maternal intake of fish containing small quantities of mercury can result in neurologic developmental abnormalities in cognitive and motor functions.

## Who is at risk from exposure?

Except in occupational settings where elemental mercury is used, most of the health risk from mercury exposure is due to methylmercury ingestion from fish consumption. Many factors determine risk from exposure including the dose, the duration, and the type of contact. The developing fetus and young children are a higher risk population because methylmercury in the mother's body may enter the unborn child and breast-feeding infants. Young children are at risk because their nervous systems are still developing and because of their lower body weight as compared to adults. Adults who consume an unusually large amount of contaminated fish on a regular basis may also be at risk. Exposure and health risks may be determined by measuring the amounts of mercury in blood, urine, breast milk and hair. Over time, your body can rid itself of some contamination.

## How is New Jersey reducing mercury exposure and sources in the environment?

The New Jersey Department of Environmental Protection (DEP) is investigating ways to reduce mercury levels through several programs. Under an agreement with the U.S. Environmental Protection Agency (EPA) to protect human health and the environment from adverse effects of mercury, the DEP intends to find ways to:

- reduce mercury levels in the air from stationary sources
- reduce human exposure to mercury from contaminated ground water
- explore sources of mercury in soil, surface waters and sediments
- assess mercury levels in freshwater and marine fish
- reduce exposure to mercury from eating fish from New Jersey surface waters
- use emerging scientific data to update health risks from mercury and to update fish consumption advisories
- increase awareness and understanding of fish consumption advisories.

### *Stringent emission standards*

DEP's mercury regulations for municipal solid waste incinerators are the strictest in the nation. Mercury emissions from municipal waste combustors in New Jersey have declined from a total of approximately 4,000 pounds per year in 1993, to a total of about 330 pounds per year in 1999, due to a combination of emission controls and source reduction. In addition, approximately 90 percent of small facilities have shut down their incinerators and are using alternate waste disposal options, resulting in cleaner air. Apartment complex incinerators were among those facilities shut down, resulting in the curtailment of an additional estimated 140 pounds per year of mercury emissions.

Facilities with medical waste incinerators have either stopped incineration or reduced mercury in the waste stream by over 90 percent, lowering mercury emissions from this source category by an estimated 740 pounds per year since 1990.

### *Source separation*

Some county incinerators have reduced mercury levels in their emissions over 90 percent. This has occurred through a coordinated program of mercury control technology, source separation programs for recycling batteries and fluorescent light bulbs, and source reduction programs. Manufacturers are reducing the amount of mercury in these products.

The New Jersey Battery Management Act required industry to reduce mercury in all alkaline batteries. Also, the amount of mercury in fluorescent bulbs has been cut in half.

### *Fish advisories*

A multi-agency committee has been established to review and recommend fish consumption advisories. DEP has sponsored fish studies on those fish species found to have significantly elevated mercury levels. Based upon this data, this committee issued statewide and waterbody-specific fish consumption advisories for largemouth bass and chain pickerel in 1994. DEP and the Department of Health and Senior Services have been conducting outreach programs with brochures, meetings, videos, and mailings to health officers, fishing organizations, women's health clinics, obstetrician and gynecologist offices, and other outlets to inform the public.

In addition, DEP is conducting various studies that will provide DEP with more information on mercury levels in fish and a basis for revising, as necessary, the existing fish consumption advisories.

### *Remediating mercury-contaminated ground water*

Mercury has been detected above the drinking water standard in the water from over 300 private wells serving residents in southern New Jersey. DEP has provided water treatment or has paid for the hookup to nearby water supplies for these well owners. DEP has determined that any well less than 200 feet deep and tapping the Kirkwood-Cohansey aquifer system is potentially vulnerable to mercury contamination and therefore homeowners should have their water tested. The aquifer covers all of Atlantic and Cumberland counties, and parts of Burlington, Camden, Cape May, Gloucester, Monmouth, Ocean and Salem counties. DEP continues to conduct its own research as well as work with external groups on the issue of sources of the mercury contamination, the best type of treatment to remove the mercury, and whether the mercury in ground water is a significant contributor of mercury to surface water systems.

### *Other ongoing DEP mercury-related studies*

■ To understand the extent of the air deposition problem in NJ, a nine-station NJ Atmospheric Deposition Network (NJADN) was established in 1998 across the state to monitor the types and amounts of contaminants being deposited on NJ soils and water. Atmospheric deposition results to date indicate that the average wet deposition of mercury in New Jersey is in the range of 15 micrograms/square meter/year. This is somewhat higher than other studies have shown for most of the Eastern U.S.

■ Monitoring Trace Levels of Mercury in Precipitation - Monitoring has taken place at five locations seasonally for the past five years. The sampling is complete and the report is in progress.

## *Creation of new mercury task force*

Former Governor Whitman requested DEP Commissioner Robert Shinn to create a Mercury Pollution Task Force. The task force, which began meeting in 1998, is developing recommendations to further reduce mercury pollution. The 20-member task force is chaired by Michael Gochfield, MD, Ph.D, of the Environmental and Occupational Health Sciences Institute at the University of Medicine and Dentistry-NJ.

## **What recommendations has the federal government made to protect human health?**

Environmental mercury concerns are not unique to New Jersey. EPA has set a limit of 2 parts per billion for mercury in drinking water nationwide. EPA also recommends that the level of mercury in rivers, lakes and streams should be no more than 0.144 parts per billion for the protection of human health; this is the value currently used by DEP for surface water quality. The FDA has set a maximum permissible level of one part of methylmercury in a million parts of seafood. EPA's Office of Water has issued guidelines for fish consumption advisories for methylmercury which are very similar to those previously issued by the DEP.

### *Recent federal and regional reports on mercury*

*(DEP has had some role in the development of the first, second and third reports.)*

■ *National Academy of Sciences Assessment* - June 2000. A review of the most recent scientific studies of the health effects of methylmercury.

■ *EPA's Report to Congress* – December 1997.

Provides an assessment of the magnitude of mercury emissions in the country by source, the health and environmental implications of those emissions, and the availability and cost of control technologies. The report is viewed as a “snapshot” of current understanding of mercury. It does not quantify the risk from mercury exposure because of scientific uncertainty in a number of areas.

■ *Northeast States and Eastern Canadian Provinces – Mercury Study: A Framework for Action* – February 1998. Presents a detailed regional emissions inventory, the results of a deposition modeling analysis and an overview of regulatory actions, a regional summary of available data on mercury levels in fish tissue, and other initiatives relevant to mercury. The report notes that mercury emissions from utility and non-utility boilers (totaling about 31 percent of combustion sources) are largely unaddressed by current regulations.

■ *EPA's Utility Air Toxics Report to Congress* – February 1998. Concludes that mercury from coal-fired power plants is of serious concern. Power plants account for about one-third (52 tons) of annual man-made mercury emissions in this country. The report states that EPA has been unable to identify any currently feasible, commercially available technology for reducing these emissions. It recommends further evaluation of potential control strategies. EPA is completing data collection on mercury in coal and the effects of various control systems on mercury emissions, and is planning to make a recommendation regarding further control strategies by the end of 2000.

## Information For Well Owners

Well owners who suspect that their water is contaminated with mercury should contact their county health department for more information and a list of state certified laboratories that conduct mercury testing.

### County Health Departments

Atlantic	609-645-5935	Bergen	201-599-6100
Burlington	609-265-5548	Camden	856-541-7759
Cape May	609-465-1187	Cumberland	856-453-2150
Essex	973-228-8152	Gloucester	856-262-4100
Hunterdon	908-788-1351	Middlesex	732-494-6742
Monmouth	732-431-7456	Ocean	732-341-9700
Passaic	973-881-6922	Salem	856-935-7510
Somerset	908-231-7155	Sussex	973-948-4545
Warren	908-689-6693		

In Hudson, Mercer, Morris and Union counties, well owners should contact their local health departments.

DEP has several offices that can offer assistance if there are questions that cannot be answered by the county health department.

The Bureau of Environmental Measurements and Quality Assurance [609-633-0752] has lists of state certified laboratories.

The Bureau of Safe Drinking Water [609-292-5550] has information on state and federal drinking water standards.

The Bureau of Site Management [609-984-2990] can give guidance on solving the problem of contaminated well water, or installing point of entry treatment systems.

The Environmental Claims Administration [609-633-0719] can provide information on possible reimbursement toward the cost of treatment or connection to an alternative water supply for homeowners with contaminated wells.

The Division of Science, Research and Technology [609-984-6070] can give information on studies of health and environmental effects of mercury levels, fish consumption advisories and mercury levels in the New Jersey environment.

Website: <http://www.state.nj.us/dep/dsr>

Visit these websites for additional information:

New Jersey Department of Health and Senior Services: <http://www.state.nj.us/health/eoh>

United States Environmental Protection Agency: <http://www.epa.gov>